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National Defence

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Kodachromes by Shirley Millson
Access to the land-locked harbour of St. John's is gained through a narrow entrance in the coastal cliffs. Fort Amherst, on the south shore, is on the point at right and the lighthouse marks Chain Rock, used in the early days to moor one end of a chain that blocked the harbour against hostile vessels.

The north-west shore of the harbour, as seen from the Southside Hill. Finger wharves protrude into the harbour; behind the city rises in tiers, presents a pleasing blend of the old and new. Water Street, known as "the oldest street in North America", runs along the water-front.



The Port of St. John's

by H. T. RENOUF

ST. JOHN'S harbour, on the Great Circle Route between New York and Liverpool, is the port nearest to Europe on the North American Continent. It is a large and important base for fishing, including both local and foreign trawler fleets, and for fish processing operations. The bulk of Newfoundland salt cod-fish and a great part of the Island's fresh fish products are processed and trans-shipped through St. John's. It is the base of the Newfoundland sealing fleet and the centre of seal processing operations. The port of St. John's is used for the export of a large part of Grand Falls' paper during the winter months. Most of Newfoundland's manufacturing industries are centred in or near St. John's. It is the eastern terminal of the Canadian National Railways and of Trans-Canada Air Lines. It is the commercial and political capital of Newfoundland.

St. John's is also Newfoundland's principal port of entry for goods from Europe, the United States, the United Kingdom and the Canadian mainland, with regular shipping services to Liverpool, Halifax, Boston, Montreal and the Great Lakes' ports. St. John's is the largest centre for distribution of supplies to the eastern and northeastern coasts of the Island, where most of Newfoundland's population resides. It is also the principal port of entry for supplies and equipment for the United States Northeast Air Command, which maintains military bases adjacent to the city. Water Street, fronting on the harbour, is said to be the oldest street in North America, and this has been expressed by Michael F. Harrington in the following lines:

I am the City Maritime,
And who shall question me my right to this?
I was, before Manhattan Isle changed hands,
Traded for beads and buckles; middle-aged
When Halifax was pink-cheeked and full breasted;
And when proud Rio was a noisome swamp,
Commerce was striking bargains on my docks.

Newfoundlanders contend that John Cabot, having come southward from Cape Bonavista in June 1497, entered the land-locked harbour of St. John's, which he named in honour of the Saint whose feast day it was. It is also claimed

that the Portuguese explorer Gaspar Corte-Real called at St. John's while in these waters in the year 1500.

The first recorded communication from St. John's is dated August 1527. It was written by John Rut, master of the vessel *Mary of Guildford*. In this letter, the writer mentions the presence of many foreign vessels. Thus it seems that the fishing fleets of the Portuguese, French, Spanish and others, marshalled in St. John's harbour in the very early days, just as they do today.

On the 3rd of August, 1583, Sir Humphrey Gilbert, half-brother of Sir Walter Raleigh, called at St. John's on his way to explore the lands to the south, and "attempted to establish colonies where land might be found suitable." On the 5th of August, 1583, Sir Humphrey took formal possession of the Island in the name of Queen Elizabeth I on a site near Water Street in St. John's.

In the same year as Gilbert's visit, Sir George Peckham published the first printed book on Newfoundland in which he outlined proposals for the fortification of St. John's. However, Fort William, erected on the site of



The National War Memorial at St. John's honours Newfoundland's war dead. Erected after the First World War, it stands on a height above Water Street, near the site where Sir Humphrey Gilbert took formal possession of Newfoundland in 1583.

Shirley Millson



Entrance of St. John's Harbour

The Narrows of St. John's. Reproduction from The Log Book of the Pegasus, 1786.

Public Archives of Canada

the present Newfoundland Hotel, was not built until 1618.

In the year 1640 the harbour of St. John's was further fortified by Sir David Kirke, who was the conqueror of Quebec (1629), and the garrison successfully repelled attacks by the Dutch in 1667 and 1673. In 1696 the port was captured by the French under the command of Pierre Le Moyne, Sieur d'Iberville.

In 1705 the town of St. John's successfully resisted attack by the French Governor of Placentia, but was captured by these forces three years later. In 1762 St. John's changed hands between the French and the English once again. It was captured by the French in June 1762 and reconquered by Colonel William Amherst in September of that year. Following recapture of the town by Amherst, many new forts and batteries were constructed and the town never again fell to foreign forces, although it was threatened on a number of occasions.

At the beginning of the nineteenth century, the population of St. John's was just under 6,000 having approximately doubled in ten years. By the middle of the nineteenth century, in spite of many adverse factors and several disastrous fires, the town continued to grow

until it became the business and social centre of the whole Island. St. John's held a key position in the commercial structure of the Island because the nature of the cod-fish business required heavy financing as well as specialized knowledge of foreign markets. Although the economic importance of the cod-fishery has declined relatively, the capital city holds its place at the head of Newfoundland's scheme of things by virtue of its capital assets, financial, economic, cultural, administrative and political.

Scattered around the 6,000-mile coastline of the Island of Newfoundland are about 1,300 small fishing settlements. Cod-fishing was virtually the only occupation in these outports. It was largely a family enterprise over the generations: the father and son went to sea in small boats during the season and returned with their catch at the end of the day. The fish was then salted by the women of the family, so that while the fish was in, the men got back to the ocean and harvested as much as possible while the opportunity lasted. As fish is a highly perishable commodity, prompt and skilful salting was important. In this way, fish was preserved and made ready for shipment to St. John's, whence it was marketed by the

THE PORT OF ST. JOHN'S

business houses of Water Street, which financed the catch at the outset, and was shipped to the overseas markets of Italy, Spain, Portugal, Brazil and the West Indies. The Grand Bank and Labrador fisheries were carried on by deep-sea sailing vessels, some curing their fish ashore, others carrying it in "salt bulk" directly to the markets overseas.

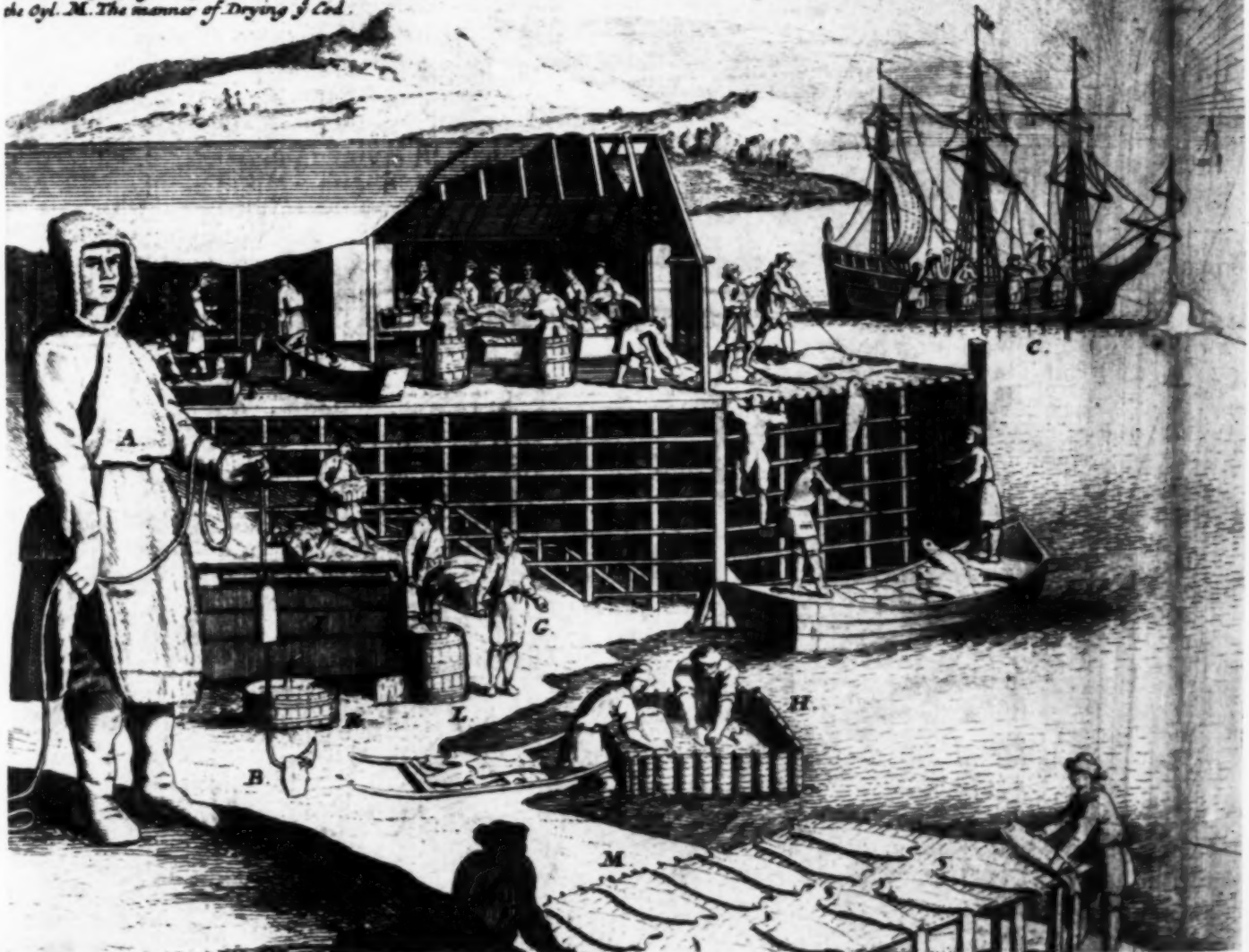
The Newfoundland salt cod-fish industry was unstable on two fronts. Often the fish did not strike in within reach of the small boat fishermen around the coast; or stormy weather, bait shortages, or other factors, adversely affected the deep-sea fishery. Even if the fishery was good, there was no assurance that the Mediterranean, Caribbean, or Brazilian markets were

prepared to take salt fish at a reasonable price. When the fishery failed, whether because fish was scarce or because the price offering was too low, at the end of the season the fisherman was often unable to pay the debts he had incurred in buying the essentials for a modest standard of living. He had to be "carried" until the next season by the outport merchant who, in turn, depended on St. John's for long-term credit in order to be able to advance the flour and salt meat, the butter, sugar and tea, the kitchenware and the clothing, which were necessary to sustain the unsuccessful fisherman until another season and perhaps better luck came his way. In other words, the economic substance of the Island's principal industry came from the

It was cod that abounded in the coastal waters and on the banks of Newfoundland that first lured Europe's mariners from their home waters. The illustration below shows the manner of catching, curing and drying cod in the early eighteenth century. Drawing from Moll's map of North America, published c. 1712, in the Public Archives of Canada.

Public Archives of Canada

A View of a Stage & also of y^e manner of Fishing for, Curing & Drying Cod at NEW FOUND LAND.
A. The Habit of y^e Fishermen. B. The Line. C. The manner of Fishing. D. The Dressing of y^e Fish. E. The Trough into which they throw y^e Cod when Dressed. F. Salt Boxes. G. The manner of Carrying y^e Cod. H. The Cleansing of Cod. I. A Press to extract y^e Oyl from y^e Cods Livers. K. Casks to receive y^e Water & Blood that comes from y^e Livers. L. Another Cask to receive the Oyl. M. The manner of Drying y^e Cod.





The power winch hoists a catch of fish aboard the dragger Pennyworth, off the south coast community of Ramea. The fish taken here is "rosefish", otherwise known as "redfish" or "brim", which is marketed under the name of sea perch.

Walter Turnbull



Small craft lie at anchor in the blue harbour, about a mile and a half long by the fishing industry of Ramea is served by frozen fillets to market.

financial backing of Water Street advanced against the prospect of a successful season and the credit of fish stocks which often had to be held long in waiting for favourable markets.

Fishing is no longer the principal occupation of Newfoundlanders. Alternative and off-season employment at good wages is to be had in the woods, the mines, on the highways and in construction work throughout the Island, and this has drawn fishermen from their traditional calling. The 1,300 outports, however, continue to exist and indeed flourish. Their needs in fact have increased many times over with the new prosperity, resulting from diversified opportunities and social payments from Ottawa. These increased needs are met largely from St. John's, where long-established business relations exist and long-term credit, as well as a very wide range of merchandise available at short notice, is to be had.

Behind all this is the port of St. John's, located on the north-east coast of the Avalon Peninsula. The harbour is formed of a bay 7,000 feet long and 1,000 to 2,000 feet wide — a small, narrow exit leading to the Atlantic Ocean. A cliff 500 to 600 feet high protects the harbour from the Atlantic gales. The narrow entrance

prevents large waves from penetrating into the harbour and only during easterly storms is part of the harbour somewhat affected. The ocean waves usually break between Chain Rock and Pancake Rock where the entrance to the harbour is at its narrowest. The spring tide in St. John's harbour rises about $4\frac{3}{4}$ feet and the neap tide, $3\frac{1}{2}$ feet.

The predominant winds in St. John's harbour are from the west in autumn and winter, and from the south-west in the spring and summer. Records show average monthly wind velocities between fifteen and nineteen miles per hour, although gusts as high as one hundred miles per hour have been observed. The climate at St. John's is humid and cool with a yearly precipitation of about sixty-two inches. The average yearly temperature recorded during the last fourteen years is 40.8° Fahrenheit, with a maximum of 86° Fahrenheit and a minimum of 10° Fahrenheit. The climate has shown a gradual tendency to warm since the beginning of the present century, particularly during the winters. Occasionally drift-ice fills the harbour during March, April and May. This condition has occurred twice since 1949, to the extent of blocking the harbour and preventing its use for



The blue harbour of Ramea. This island settlement has some 1,100 inhabitants. The served as a processing plant which turns out packaged fish to market.

Walter Turnbull



The catch at Bonavista is spread on flakes to cure in the September sunshine. Cod-fishing is the principal occupation of this outpost, which takes its name from the cape made famous as John Cabot's landfall in 1497. The town has cold storage facilities and an artificial fish-drying plant.

Shirley Millson

navigation, although an ice blockade of St. John's had not previously occurred since 1937. Generally speaking, in view of the prevailing winds from the west, the influence of ice on navigation is only temporary and is not considered a very serious problem. There are 144 sunny days during the average year.

A large part of the north side of the harbour is faced with commercial buildings occupied by the leading merchants of the area. The backs of these mercantile premises face the water and each premise has a number of finger wharves which, in earlier days, were of prime importance for docking schooners which loaded fish and unloaded supplies of various kinds for the large-scale coastal traffic which focused on the harbour of St. John's and later dispersed itself in a thousand coves around the Island. The wharves were accessible only through narrow coves and arches leading from the main street. As Newfoundland began to develop roads, and the general economic pattern showed signs of change, the schooner operations diminished sharply and many of the finger wharves referred to fell into disuse and decay. The principal cargo-handling areas of the port concentrated in the east end of the harbour are served

by marginal-type wharves owned by private St. John's firms. Over these wharves a large part of Newfoundland's imports and exports moves. These have now become inadequate for the volume of traffic flowing through the port. Because, however, of the situation mentioned earlier, no suitable enlargement of these premises was possible, and new locations could not be found where a feasible development by private enterprise for the modernization of the port could be undertaken.

Under the Terms of Union between Canada and Newfoundland, it is stated that consideration will be given to the establishment of one or more National Harbours in the new province, at Newfoundland's request. As a consequence of this implied undertaking on the part of the federal government, the Newfoundland Board of Trade pressed the federal government in Ottawa to the effect that if St. John's was to remain the principal centre of distribution within the Island, and if Canada was to maintain at a reasonable level of efficiency her most easterly port, renovation and modernization of the harbour was essential.

As a result of this and other representations, the federal government in due course ap-



The boot-shaped harbour of St. John's as seen from the air. The built-up areas extend along the north and west shores of the harbour. At top right is Quidi Vidi Lake with Pepperrell Air Force Base on the far shore.
R.C.A.F.

pointed the Foundation of Canada Engineering Corporation, Limited, to make a survey of the existing conditions of St. John's harbour and to make recommendations for its modernization. Preliminary surveys were undertaken by this company in October 1956. At the conclusion of the study, F.E.N.C.O. submitted to the Department of Public Works in Ottawa a report containing the results of the survey, together with an economic analysis of the condition of the harbour and recommendations as to the necessity of improvements, including preliminary designs of changes in and additions to its facilities. As a result of their survey, the company stated that the cost of handling general cargo in St. John's is roughly double that in other Canadian ports. They also stated that in addition, the cost of direct transit is considerably higher because of the inconvenient location of deep-water berths relative to the rail terminal and main highways. They also confirmed the lack of sufficient storage facilities in warehouses and the problems presented by the narrow approaches and the dearth of parking

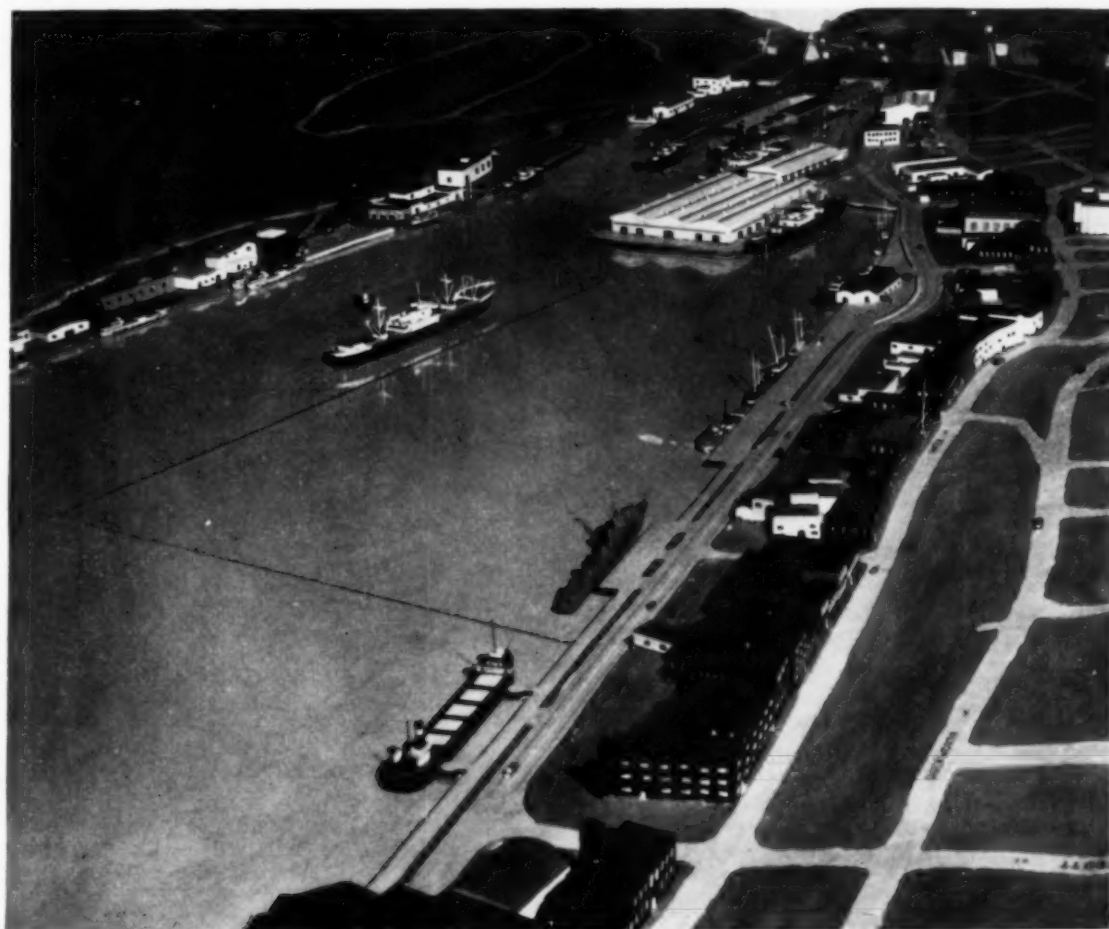
areas, which added still further to harbour difficulties.

The Foundation Company recommended to the Department of Public Works the construction of a large finger wharf and an adjacent marginal wharf in the west end of the harbour to offer modern berthing facilities for ships up to 10,000 tons capacity. The wharves would provide three berths, each 500 feet long for large ships, and one auxiliary berth 390 feet long for small ships, giving a total of 1,890 feet of deep-water berths. These wharves will be located close to the main highways leading to and from the city and will connect directly with the Canadian National Railways terminal to provide an economical way of handling the direct, and part of the indirect, transit. In addition, there will be about 2,200 feet of marginal wharves for coastal shipping to the west and north of the main finger wharf, and along the north shore. To the west end of the south shore a 600-foot marginal wharf is to be built by the Department of Transport to accommodate their coastal ships. A basin for small boats will be



The scale models shown here give some idea of the harbour development scheme. At top:—A view of the western end of the harbour showing in the foreground the Southside Hill. Below:—View looking west along two main arteries—Duckworth and Water Streets. These pictures show the proposed berthing facilities and the new water-front road to be constructed along the north shore.

Pat Dillon, Musical Clock Ltd.





The fishing fleets of the Portuguese, Spanish and French gather in St. John's harbour just as they did in the sixteenth century. In the background, atop Signal Hill, can be seen Cabot Tower, where Marconi received the first transatlantic wireless signal in 1901.

Water Street is the commercial and shopping centre of St. John's and hence of all Newfoundland. Bowrings', one of the larger department stores, can be seen at left.

Shirley Millson



THE PORT OF ST. JOHN'S

provided to the west of the Department of Transport wharf, with a total berthing space of 900 feet. In addition, several positions for ships such as fire boats, tugs or auxiliary craft not in use, will be provided in the west end of the harbour, and a service road will be built along the north shore by demolishing present dilapidated timber structures and replacing them with an embankment. This embankment will carry four twelve-foot-wide traffic lanes, and a foot walk. The service road will permit distribution of goods from the new terminal, as well as from the existing deep-water berth in the east end of the harbour, to the wholesale and retail warehouses located along the north shore water-front, thus reducing the congestion along Water Street. The south shore service road will be completely rebuilt and two new access roads will be extended from this roadway to serve the water-front. This will permit re-routing the traffic now using the wharves as roadways.

The new terminal, to be built in the west end of the harbour, will provide the most modern loading facilities and two large transit sheds, one 440 feet by 310 feet, the other 320 feet by 100 feet. Also an office building, mechanical equipment, workshop and yards, parking and waiting areas will be provided for this development. Goods will be handled by means of fork-lift trucks and mobile cranes. Provision has been made for the expected loading of packaged goods by means of ramps at the sides and bows of ships. One fifty-ton-capacity derrick will handle the occasional heavy loads. Several railway tracks will link the new terminal with the railway yards located to the west. The Canadian National Railways are at present planning to enlarge their existing yards. Under the plan, rail and road traffic has been separated, with only a few unavoidable crossings remaining. In addition, the 900-foot marginal wharf along the north shore, which has twenty-five feet minimum water depth, can be used for mooring medium-sized ships when taking refuge in the harbour during storms. Merlin Rock, which is located at the north of the harbour entrance and is at present a danger to navigation, will be blasted down to thirty-five feet below the water-line. The harbour will also have a tug service to expedite mooring and berthing operations.

The new harbour development will make it possible to handle approximately 250,000 tons of general cargo per year in addition to that handled in the harbour at present, which at the moment is approximately 800,000 tons of inward and outward freight. The engineers estimate that this amount can easily be doubled in the future without major additions to the facilities planned. It is anticipated that the new harbour would be administered by a Harbour Commission consisting of three members — one nominated by the Council of the City of St. John's and two by the Lieutenant Governor in Council, one of whom would be upon the recommendation of the Newfoundland Board of Trade.

Thus the oldest seaport in Canada will come into its own and will serve the growing needs not only of Newfoundland but all of Canada. A nation's seaports are among its most vital assets, and with the modern installations described above, St. John's harbour will be able to receive and handle with great dispatch an increasing volume of goods from places far and near. Towns are springing up in Newfoundland Labrador as mining development takes place at a rapid pace. Inevitably the vast forest resources and water-power of this area will be turned to account. The mineral riches of the Burlington Peninsula forecast new prosperity for Newfoundland's north-east coast. Timber and water-power are mapped and ready for exploitation in Baie d'Espoir, on the south-west coast. As the economy of Newfoundland grows and strengthens, the commerce of St. John's will be called upon to meet new demands for goods and services. In this, its regenerated port facilities must play a vital part.

The House of Assembly at St. John's has been the seat of government in Newfoundland for over a hundred years. It was formerly known as the Colonial Building.

Shirley Millson





This twin-rotor helicopter, in service with the RCAF since 1954, is employed mainly on search and rescue missions. It can hover up to 9,600 feet, has a range of more than 350 miles, and cruises at 110 m.p.h. Maximum carrying capacity is 20 passengers.

National Defence

The Story of Helicopters in Canada

by LES EDWARDS

A RECENT investiture in Ottawa brought to mind a 1955 drama when twenty-one crew members of the doomed Liberian freighter *Kismet II* were plucked from almost certain death by a Royal Canadian Navy helicopter along the rocky northern coast of Cape Breton Island. Aground at the base of a 900-foot cliff, the vessel was being pounded to pieces by heavy seas and a gale. Rescue was

impossible by land or sea and the ensuing helicopter drama hit front pages across North America and won medals and citations for the RCN participants.

On July 1st, 1959, in Ottawa, Queen Elizabeth presented the George Medal to Lieutenant-Commander John H. Beeman of Fort William and Lieutenant-Commander F. Roger Fink of Ponoka, Alberta, for their part in the dramatic

THE STORY OF HELICOPTERS IN CANADA

rescue. The Queen's Commendation for Brave Conduct went to two men who are now civilians, Petty Officer Lawrence P. Vipond of Ancaster, Ontario, and Leading Seaman Paul A. Smith of Oshawa.

Snow squalls, with a heavy gale, whipped across the face of the cliff as the four flew a Sikorsky S-55 helicopter to where the *Kismet II* was trapped. Sailors aboard the freighter wielded axes to clear a landing platform. The helicopter touched down precariously in heavy turbulence and four sailors scrambled aboard. Three more trips were made to clear the rest of the crew, leaving the wild sea to smash the ship to bits.

The story is typical of the inspiring legend being carved out by this ugly duckling of the aviation world, which has operated in this country for only a dozen years.

The helicopter-operations field is almost limitless: transportation of men and supplies; patrols of pipelines, hydro lines and microwave stations; timber cruising and spraying; crop dusting; insect and pest control; airborne geophysical survey; ambulance work; traffic control; hoisting heavy objects into otherwise inaccessible places; specialized defence roles; iceberg spotting; shaking ice from power and telephone lines; and many other uses, including transport of department store Santas.

No testing ground on earth could match Canada's bitter winters, hot summers, its towering mountains, impenetrable forests and endless wastes. And no country has made better use of the helicopter in carrying men beyond its natural barriers in search of better things. Just as the helicopter is now an everyday sight at Kitimat, Uranium City, Churchill or Knob Lake, the flapping of helicopter rotors may soon be just as familiar over Yonge Street, St. Catherine Street, Sparks Street, Portage Avenue or Granville Street. It may soon take the place of other aircraft, trains or buses, on short-haul passenger and freight routes.

Having cut its commercial teeth in the backwoods and mountains, it is now making a strong bid for a foothold in Canada's more populated areas, heretofore reserved for more sophisticated aircraft. A helicopter air taxi and cargo service was recently started in the Tor-

onto area. Plans have been announced for another operating out of Vancouver. And the day of scheduled helicopter airlines cannot be far off in Canada. Helicopter air transportation within metropolitan areas and from city to city offers a great challenge to airmen. Great things are expected of vertical take-off and landing (VTOL) aircraft, hovercraft and flying cranes now appearing on the market. But to appreciate the present, we must look at the history of the helicopter.

In the sixteenth century, Leonardo da Vinci drew pictures and built models of machines with whirling blades. But it was not until 1937 that the German "Focke-Achgelis" performed a lengthy flight—one hour and twenty minutes. The first successful flight in the Western Hemisphere took place only twenty years ago, during the first year of the Second World War, when Ivor Sikorsky's VS 300 made its maiden flight at Stratford, Connecticut. The design of this machine proved superior to earlier designs in that it was susceptible of progressive improvement up to the commercial stage. Much remained to be done and the helicopter industry did not play a big role in the war, but in 1946 the Bell Helicopter Corporation in the United States received a licence for commercial use of



A royal passenger. Princess Margaret steps from an RCAF Sikorsky S-58 helicopter during her 1958 Canadian tour. The helicopter had taken her seventy-five miles from Prince Albert to Waske-siu, Saskatchewan.

Star-Phoenix

the helicopter. The Korean conflict — in the early 1950s — was a different story with the helicopter playing a magnificent role in search and rescue and communications work.

The first civilian helicopter in Canada — a Bell 47B3 — was registered by Kenting Aviation Limited, Toronto, in May 1947. The machine is still flying, although it has been modified and is owned by a different company. Department of Transport records now show close to 200 civilian helicopters registered in Canada, and a further 100 are used by the military services.

The world's largest rotary-wing operator is the Okanagan group with some 60 machines. Spartan Air Services Limited, Ottawa, with about 35, and Autair Helicopters Limited, Montreal, with 22, also rank amongst the world leaders. Other Canadian operators are: Associated Helicopters, Edmonton (12 machines); Pacific Helicopters, Vancouver (8 machines); Dominion Helicopters, Dominion City, Ontario (7 machines), and smaller fleets operated by Western Helicopters, Northern Wings Helicopters, Klondike Helicopters, Wheeler Airlines, World Wide Airways, Northern Helicopters, Foothills Aviation, Vancouver Island Helicopters, Hudson Bay Air Transport and others.

Buying, maintaining and learning to fly a helicopter is expensive. Hence the hourly rental rates for these machines are high: \$75-\$100 for smaller aircraft to several hundred dollars for

larger transport types. Cost of the 3-4 passenger machines ranges from \$50,000 to \$78,000. Transports cost \$250,000; and the new Roto-dyne, \$1,000,000. The cost of obtaining a helicopter pilot's licence is about \$2,500, with pilots earning \$500-\$1,000 a month.

The helicopter pilot must learn a flying technique almost entirely different from that used in conventional aircraft. New experiences are possible: hovering, flying backwards, sideways, or up and down as in an elevator. New controls are involved. Cyclic pitch (similar to the control stick in an ordinary aircraft) moves the machine in any direction in the horizontal plane. Collective pitch (a lever beside the pilot) raises or lowers the helicopter by increasing or decreasing the pitch of the main rotor blades. The twist-grip throttle control is linked to the collective pitch handle and automatically increases or decreases power as the pitch is increased or decreased. The anti-torque (rudder control) pedals operate the pitch-change mechanism of the small tail rotor which keeps the helicopter from spinning on its axis.

Helicopters are amazingly safe machines but they do crash, sometimes with fatal results. According to the Department of Transport, about twenty people have died in helicopter accidents in Canada since 1949 in 200,000 hours of flying. Helicopters are capable of "autorotation", which allows the rotors to continue whirling after the engine stops in the air so the pilot can drop the aircraft into a suitable spot.



One of the earliest helicopters in Canada, an open cockpit Bell 47. This photograph was taken in 1947. Since then the aircraft has been modified with a bubble cockpit and other refinements and is still in service.

A Bell 47 of Okanagan Helicopters operating from a platform high in the Canadian Rockies on the Kitimat-Kemano project. The use of helicopters brought an immense saving in time and cost during the construction of the hydro-electric power plant and transmission lines.

Bell Helicopter Corporation



Flying control is maintained in "autorotation" and a cushioning effect can be achieved just before the moment of impact with a sharp upward movement of the collective pitch control.

Bell Helicopter Corporation photographer Tom Free was sent from Texas to British Columbia to cover the mountain flying operations of Okanagan Helicopters and the Aluminum Company of Canada, Limited, at Kitimat and Kemano. To say he was impressed is an understatement. In an area where even mountain

goats have second thoughts, helicopters have logged thousands of hours shuttling from mountain valleys to peaks, accomplishing in weeks what might have taken years by ground transportation.

Carl Agar, now Vice-President for Research and Training at Okanagan, in 1951 won the McKee Trans-Canada Trophy (for outstanding service in the advancement of Canadian aviation) for his development of helicopter mountain flying techniques on the Kitimat-Kemano

A Sikorsky S-55 of Aluminum Company of Canada, Limited, dropping off eighteen cases of dynamite at a camp in the Rocky Mountains. The oil drums were airlifted on a previous trip.



project. When Agar set out on this adventure, the page of the helicopter instruction book on mountain flying offered little advice. Now, Okanagan is an acknowledged authority in this field.

Alcan sought a location for a new aluminum industry. Kitimat offered an excellent location for the smelter and townsite. Lakes high in the Rockies near Kemano could be tapped for hydro-electric power. The helicopter was to play a vital role in this new Canadian saga. In 1949, Agar and his crews ferried engineers around the area in helicopters to chart the best power-line routes from Kemano to Kitimat through mountains subject to the severest weather conditions.

The decision was made to erect a test power span over Kildala Pass, 5,300 feet above sea level. For some aspects of the job the only practical means of transportation was the helicopter. Again, Agar and his rotary-wing machines provided the answer. Materials and

erection crews for towers were flown to the sites by helicopter, a tremendous saving in time over other methods. Mountain flying is treacherous, with shrewd perception needed for speeds, height and depth, up- and down-drafts and for avoiding sharp mountain peaks. There are few second chances here.

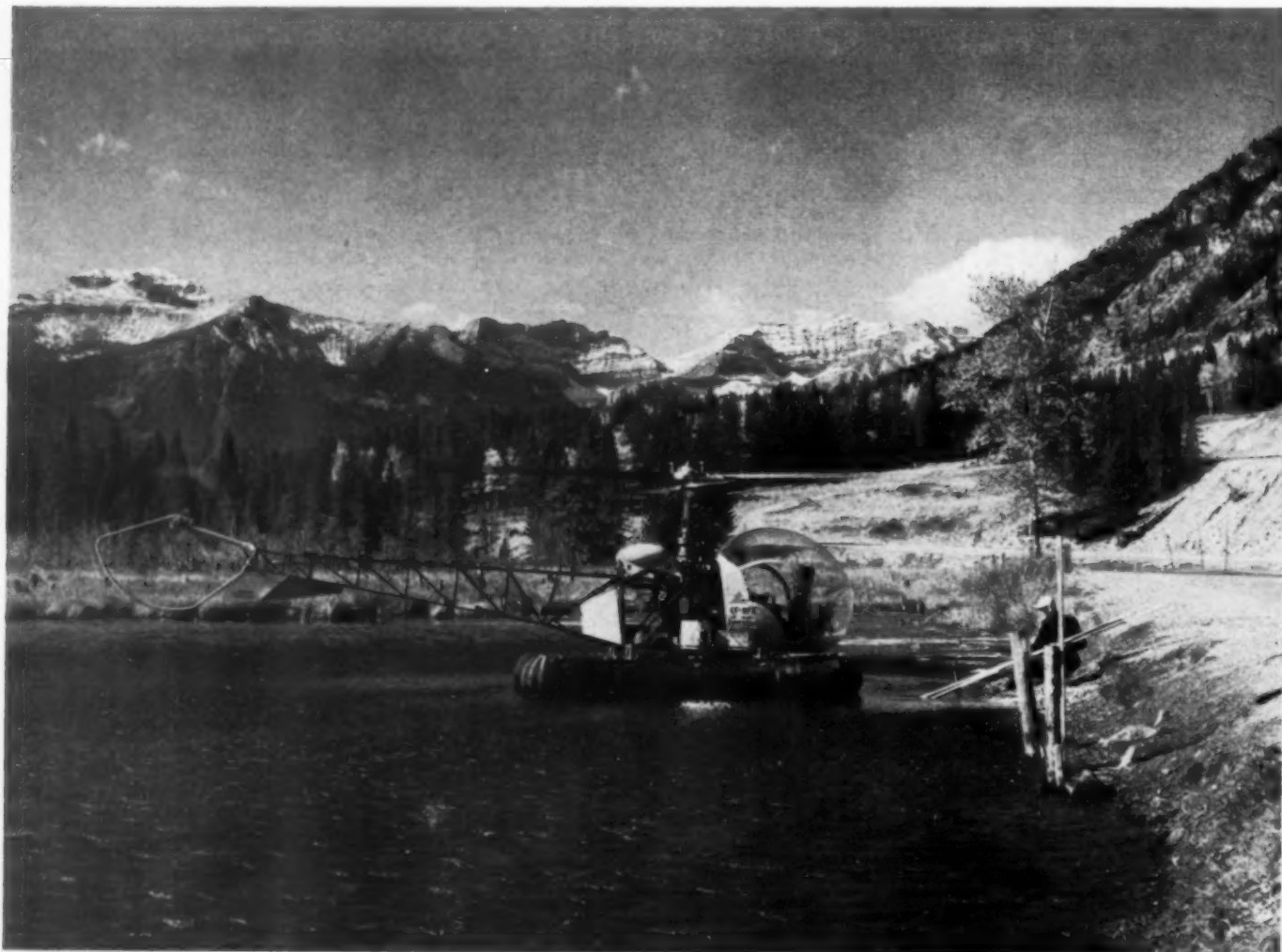
Okanagan ingenuity recently helped build a 25-mile power line in the mountains north of Los Angeles, California. Okanagan won the contract with a proposal to use a Sikorsky S-58 helicopter. In eleven days' flying time the machine hauled 450 tons of concrete for fifteen towers in the mountains. It later carried steel and components for the towers and crews to build them.

The company has ordered a 70-passenger Fairey "Rotodyne" from Britain for possible use from Vancouver-Victoria-Seattle, operating from down-town areas.

The "Rotodyne" takes off and lands vertically like a helicopter and yet flies horizon-

A pontoon-equipped Bell 47 of the fleet of Spartan Air Services Limited, at rest on a lake in the Canadian West.

Spartan Air Services Ltd.



The Hiller one-man "Rotorcycle", recently demonstrated in Ottawa to Canadian buyers. Built by Hiller Aircraft Corporation of Palo Alto, California, it weighs 300 pounds, cruises at 50 m.p.h., and folds into a package about the size of a caddy cart.

Hiller Aircraft Corporation

tally at speeds up to two hundred miles per hour like a conventional aircraft. Its two turbo-prop engines face forward on stub wings. An auxiliary compressor, driven through a hydraulic clutch, draws atmospheric air through an intake on the upper surface of the wing and delivers compressed air to the pressure jet units at the rotor blade tips. Fuel is supplied, under pressure, to the combustion chamber of each tip-jet unit and the fuel/air ratio is governed by an automatic regulator. Ignition of the fuel-air mixture is effected by two high energy igniter plugs at each unit, and these plugs are fed from an independent supply as a precaution against electric failure. Once the "Rotodyne" is lifted vertically, the transition from helicopter to auto-gyro flight is effected at cruising altitude by progressive transfer of power from the tip-jet units to the propellers, until finally the auxiliary compressors are declutched and the rotor becomes autorotative. The reverse procedure is used for landing. Okanagan will get its first "Rotodyne" in 1961, at a cost of one million dollars. The company also has applied



to the Air Transport Board for a licence to operate a helicopter air taxi service in southern British Columbia.

Mountain accidents have long been the *bête noire* of rescuers. Many injured people who might otherwise die or suffer almost unbearable pain in the descent are brought out by helicopter. A case in point: logger Tom Devine of Lumby, British Columbia, had been battling a forest fire at the 5,000-foot level of a mountain when he slipped over a cliff into a ravine, breaking his back. After days of repeated attempts by other helicopters, Flight-Lieutenant P. T. Mathews and Sergeant Ed Hickling landed an RCAF Vertol H-21 on a ledge above the injured man. Supplies and a stretcher were lowered by cable. It took stretcher-bearers three hours to edge Devine up the mountain-side to the helicopter. Six days had passed since the accident but the logger was soon in hospital and on the way to recovery. Doctors said a descent any other way would have been unbearable and have left Devine in critical condition.

A Sikorsky S-55 of Aluminum Company of Canada, Limited, showing the sling used to carry external loads.

Bell Aircraft Corporation



A twin-rotor Vertol 42A transport machine operated for the Canadian Government by Spartan Air Services Limited, during construction of the eastern section of the Mid-Canada Line. A Bell 47 is passing overhead.
Spartan Air Services Ltd.

In August 1957, Constable Ronald Pitt was shot at Morrisburg, Ontario, while investigating a car theft. Fearing for his life, doctors at Cornwall, where he was being treated, called for a helicopter to carry him to the Neurological Institute in Montreal. At Vertol Aircraft (Canada) Limited, a helicopter firm at Arn-prior, Ontario, pilot Max Nebergall, co-pilot Tom Cannon, and crew men Johnny Bowes and Flight-Sergeant E. W. Waycott took off in an H-21 twin-rotor helicopter. Minutes later they landed at Cornwall where Constable Pitt was taken aboard; and another thirty-two minutes later they set down at Molson Stadium, Montreal, where Pitt was transferred the few feet to hospital. To Nebergall the trip was routine, for as a United States Marine helicopter pilot in Korea he had flown eighty-six evacuation missions.

The helicopter again dramatically proved its worth early in 1959 when the German freighter *Trans-Ontario*, with a 25-man crew, became stranded in the St. Lawrence River ice near Montreal. The vessel's fuel would supply heat and power for only two days but it would take ice-breakers at least four days to chop their way through. A French-built Alouette II helicopter of Autair Helicopter Services Limited, Montreal, was used on an airlift in co-operation with the Imperial Oil Company Limited. On a bitterly cold day with high winds whipping snow, Autair pilot H. J. Iverson flew 150 trips from shore to ship, carrying fifty tons of fuel to the *Trans-Ontario* to tide it over the crisis.

The day of the personal helicopter may not be too far off. Hiller Aircraft Corporation of Palo Alto, California, recently demonstrated its one-man helicopter at Ottawa. The "Rotor-



A Bell 47 acts as the "eyes" of a tractor train hauling supplies to the Thompson-Moat Lake mining area in northern Manitoba.

Spartan Air Services Ltd.

While its external load is secured, an RCN Piasecki helicopter hovers over the flight-deck of the Royal Canadian Navy's Arctic patrol vessel H.M.C.S. Labrador.

National Defence



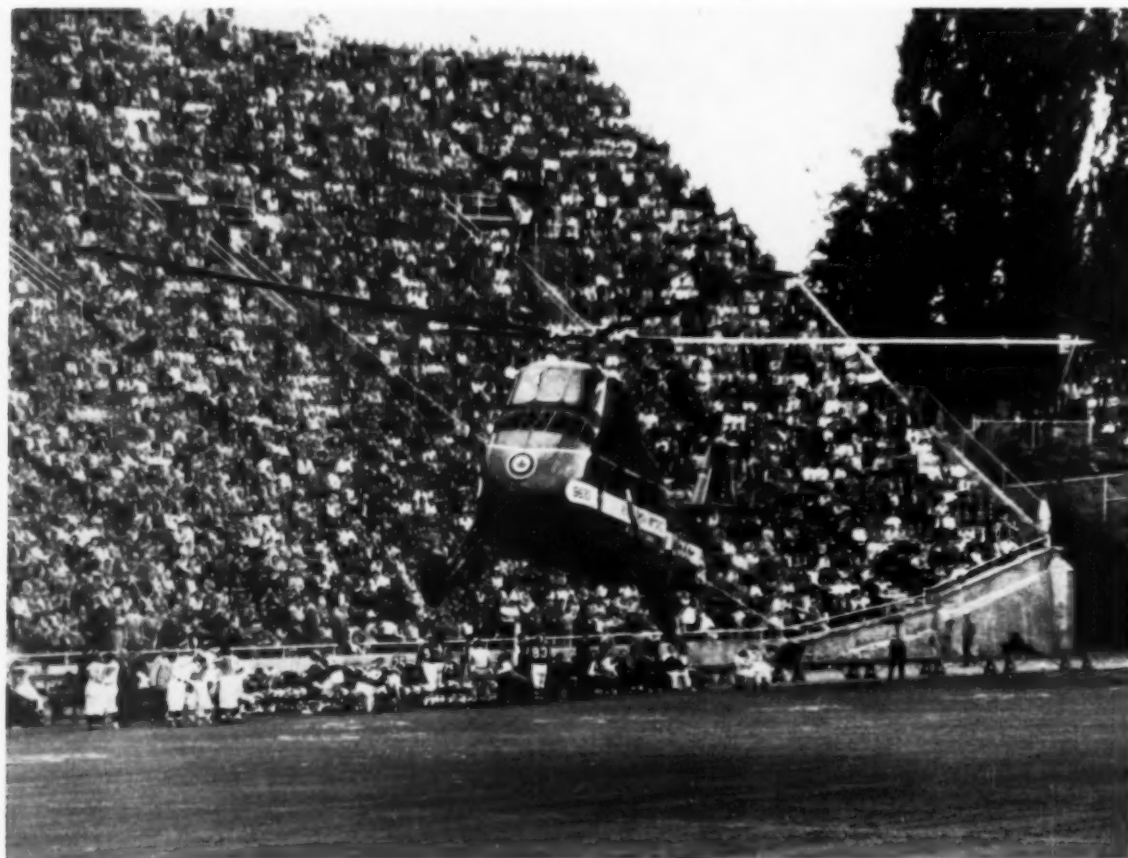
cycle" weighs 300 pounds, cruises at 50 miles per hour, climbs to 13,000 feet, will fly 150 miles on a tank of gas, and folds into a package about the size of a caddy cart. The \$12,000-machine was designed for military reconnaissance, artillery spotting, wire laying, pipeline and power-line inspection, traffic control and rescue work. In the latter role it would be parachuted to downed airmen or to stranded people who could assemble it and fly out.

Quebec Provincial Police and Radio Station CKVL, Verdun, check traffic using a Sikorsky S-51 helicopter of World Wide Airways Inc. Officers and a radio announcer cover the city from 4 to 7 p.m., watching for speeders, accidents and general traffic conditions. The helicopter can land to direct traffic or to offer

assistance to accident victims. Meanwhile, the CKVL announcer keeps his listeners informed of latest traffic developments.

What a difference the helicopter would have made in the Klondike gold rush! The Chilkoot Pass would have been child's play. But where men once sought gold, prospectors now are searching for oil. Today, Pat Callison's Klondike Helicopters Limited at Dawson City has four Bell 47s. Callison says "We're not getting rich at it but we're doing O.K." His major customers are the federal and British Columbia governments, oil companies, prospectors and forestry companies. The 1959 spring breakup of ice on the Yukon and Klondike Rivers turned into a rampage as heavy snows melted in warm weather to wash out bridges, inundate roads and rip culverts from the earth. Dawson City

Setting down at Molson Stadium in Montreal, an RCAF helicopter from No. 4 Operational Training Unit, Trenton, completes a mercy flight similar to the one described earlier in the article. Montreal Alouette and Hamilton Tiger Cat players cleared the football field to allow the helicopter to land and an ambulance transported the accident victim to the Neurological Institute.





A "rescue" operation which took place on a northern Quebec lake in spring. The light aircraft had plunged through "rotten" ice to its wingroots on making a landing. The occupants escaped wet but unharmed. A call to the RCAF at Bagotville, P.Q., brought the H-21 Vertol which is shown lifting the aircraft from the ice.

National Defence

was cut off but the danger was held to a minimum as Callison's helicopters carried sandbags to critical areas, ferried flood fighters and delivered messages where other means of communication were washed out. Helicopter pilot Bud Green once airlifted 1,500 sandbags to road crews working to save the approaches to a threatened bridge.

In 1957, the McKee Trans-Canada Trophy went to Squadron-Leader R. T. Heaslip, Officer Commanding the RCAF's No. 108 Communications Flight, a helicopter unit. As planners worked on construction details of the Mid-Canada Detection Line it became apparent that only large helicopters offered feasible transportation to sites in mountains, muskeg and forests along the 55th parallel. With no civilian firm in a position to undertake the job, the RCAF was called in and No. 108 Flight was formed in 1954 with Vertol H-21 and Sikorsky S-55 helicopters. The unit first worked on siting Mid-Canada stations in 1955, and later flew thousands of hours carrying personnel,

supplies and equipment along the warning network. It later carried out re-supply of the stations but this has now been taken over by Okanagan Helicopters with S-55s from the Pacific Ocean to Hudson Bay, and by Spartan Air Services with Vertols from Hudson Bay to the Atlantic Ocean.

The helicopter is taking an increasingly important place in Canadian military planning. The RCAF has been in the helicopter field longer than the other services and now uses the machines for air transport, communications and search and rescue work. Helicopters are spotted across the country for Air Force work and in case of civilian emergency.

The Royal Canadian Navy has been experimenting with helicopters for anti-submarine work, its special role in the North Atlantic Treaty Organization. Helicopter flight characteristics offer advantages over fixed-wing aircraft in anti-submarine work but there are also drawbacks, such as limited range, high crew fatigue rate and inability to fly in all kinds of



In flight at the Canadian Joint Air Training Centre in Rivers, Manitoba, is a Bell H-13 helicopter of the type used for training pilots.

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weather. They have been used in Naval operations from land bases and from carriers, frigates and escorts at sea. A sonar-equipped helicopter can hover over one spot, locate and track a submarine and, if necessary, carry out an attack with homing torpedoes. Work has also been done to develop methods of clearing mines by helicopter.

The Canadian Army is stepping up its study of helicopter operations. It has only a few pilots, trained mainly to fly light observation aircraft, although some are checked out on helicopters. A close examination is now being made of the possible future Army use of short take-off and landing (STOL) and vertical take-off and landing (VTOL) aircraft.

The Hydro-Electric Power Commission of Ontario operates six Bell 47s. Ontario Hydro uses the machines for power-line patrol, aerial photography, survey work, for stringing power lines across rivers and gorges, and for spraying brush and weeds along its power transmission lines.

The Department of Transport's twelve Bell 47s are used mainly as spotters on ice-breakers

of the Marine Services Branch along the east and west coasts and in the Arctic. They also serve aboard the *Baffin*, the hydrographic vessel of the Department of Mines and Technical Surveys. These "seeing-eye birds" act as aerial lookouts on ice patrols and also fly over ice and snow in the Arctic to re-supply stations within 600 miles of the North Pole.

Saskatchewan's Department of Natural Resources recently used a Bell 47 of Associated Helicopters, Edmonton, to move a forest ranger tower six miles. Associated's Operations Manager Roy Staniland said, "Moving a tower by helicopter is a simple job. It will take us about a day's work . . . three hours' flying time." And so it did. The tower was dismantled with the individual pieces lifted off the ground by the helicopter and skimmed away to a new and better location.

Just as Canada's "bush pilots" played such an important role in the first fifty years of powered flight in this country, it now seems certain that the helicopter will occupy an important place when the story of the next fifty years is told.

Right:—A rescue demonstration near Shearwater, Nova Scotia. An RCNH-19 Sikorsky helicopter hoists a man from the water with the help of a cable and winch.



Below:—Mission completed. The seaman is assisted into the helicopter after his rescue from the life raft.

National Defence photos





The Present Status of the Barren-ground Caribou*

by J. S. TENER

TO THOSE who live or work in the Arctic or sub-Arctic regions of Canada, the importance of game animals in the livelihood of Eskimos and Indians requires no emphasis. The indigenous peoples in the area extending from Hudson Bay to the Mackenzie River and from the Arctic coast to the northern portions of the Prairie Provinces at one time depended on the barren-ground caribou as a primary source of food and clothing. For many of those people the caribou was the keystone of their economy.

Today the picture is very different. Once-large herds that numbered in the thousands or

hundreds of thousands are either reduced in number or extirpated. Hunting areas that formerly yielded more than adequate numbers of caribou for northern peoples, no longer do so. The disappearance of this vital resource has had, and continues to have, a profound effect on the lives of many Eskimos and Indians.

Several government agencies are directly concerned with the decline in caribou numbers. The federal government is responsible both for the welfare of the people of the Northwest Territories and for the wise management and perpetuation of indigenous Arctic animals. The

*Published by permission of the Deputy Minister, Department of Northern Affairs and National Resources, Ottawa, Canada.

At top:—Unlike their more southerly cousins, the woodland caribou, the barren-ground caribou herd in large numbers and often return to follow the same migration routes year after year. Their well-defined routes make them easy prey for native hunters who formerly depended on the caribou as a primary source of food, clothing and shelter.

Canadian Wildlife Service

THE PRESENT STATUS OF THE BARREN-GROUND CARIBOU

governments of the three Prairie Provinces also are concerned with the barren-ground caribou, as the winter migrations of the animals take them south into the northern parts of those provinces, where Indians and a few white residents traditionally hunt them.

As a result of the concern of the federal and provincial governments, an extensive study of caribou was undertaken in 1948 and 1949 by the Canadian Wildlife Service of the Department of Northern Affairs and National Resources to determine the numbers and distribution of the animals and to gather as much information as possible about factors controlling their lives. After many thousands of miles of survey flying and many studies in the field, the conclusion was reached that barren-ground caribou were fewer in number than at any time in historical record and that the species was losing more animals each year than were being added to the population by birth. Factors contributing to losses were accidental death and predation by wolves, but the principal factor was the excessive human kill. Destruction by fire of forested areas of winter range also was thought to be a contributing factor in the decline, because of the reduction of the area where caribou could find sufficient food in winter.

Further studies of caribou indicated that the decline was continuing at an alarming rate. In 1950 some 670,000 caribou were estimated on the Arctic mainland of Canada between the Mackenzie River and Hudson Bay, but in 1955 the population was estimated, after the most intensive survey ever carried out, to be about 270,000 animals. The reports of Eskimos, Indians and white residents confirmed the aerial survey figures. The decline continues and the 1959 estimate of the total barren-ground caribou population was 200,000.

The crisis led to an extensive barren-ground caribou research study, the most detailed study a big game species has yet received in Canada. The project, carried out between 1st April 1957 and 31 August 1958, was a co-operative venture of federal, provincial and territorial government agencies. The Canadian Wildlife Service, the Province of Manitoba, the Indian Affairs Branch of the Department of Citizenship and Immigration, and the Northwest Territories Council jointly undertook the

major financing of the project. Personnel for the study was provided by the Canadian Wildlife Service, both permanent and contract biologists, and by the Province of Saskatchewan. The National Research Council provided two physiologists for a special study. The research planning and field direction were undertaken largely by J. P. Kelsall of the Canadian Wildlife Service, under the guidance of senior officers of that Service and of a special technical committee, whose members were drawn from interested federal and provincial agencies. Valuable assistance in the programme also was received from many other government organizations, from organizations outside the government and from individuals.

The major phase of the research was an intensive investigation of all aspects of caribou mortality. Causes of mortality may be varied and factors such as accidents, disease and parasites, adverse weather conditions, drownings, wolf and other predation, and human utilization, had to be assessed. Other aspects of caribou biology had to be examined because of possible influences on caribou survival. These included such factors as caribou behaviour and reproductive physiology, the influence of snow conditions on feeding, and the distribution of the animals. In addition, studies of caribou winter ranges were undertaken to assess their value and to determine the effect of forest fires on them.

One means of assessing caribou calf mortality is by counting calves in late winter. In many big game populations, about 50 per cent of the calves born fail to survive their first year of life. After that deaths are usually distributed rather evenly throughout the various age classes. By counting caribou calves in late winter, it is

Caribou-skins provide a summer tent and clothing for these Eskimos.

Manitoba Game Branch





Caribou are the only deer native to North America in which the male and female bear antlers. The cows shed their antlers about the time the fawns are born, in May or June; the adult bulls shed theirs in early winter. Opposite:—The caribou exhibit in the Museum of Natural History, Regina.

Saskatchewan Government

possible to estimate the recruitment, the number of animals added to the population that year, and that technique was employed in the present study.

It was decided early in the planning of the investigation that principal attention would be directed to a specific segment of the seriously reduced herds on the mainland barren-grounds between Hudson Bay and the Mackenzie River. In March 1957 a herd of about 100,000 caribou wintering in northern Saskatchewan was selected for investigation. Its large size and its proximity to Yellowknife, in the Northwest Territories, presented practical advantages for the study. After the herd had been selected, plans were made to support field parties in such a way that the herd was kept under observation the year round. Aircraft were used extensively to move field camps as the caribou migrated from one seasonal range to another, and to keep track of the herd movements, changing numbers and composition. The field camps were dispersed from Stony Rapids in northern Saskatchewan east to Duck Lake in northern Manitoba and north to Beverly Lake in west-central Keewatin District. Winter studies were carried out from headquarters in Stony Rapids and summer programmes from Yellowknife. In all, about 155,500 miles were flown during the study. Travel in winter by the more conven-

tional northern means of dog teams involved about 2,000 miles, and more than 1,000 miles were travelled by canoe in summer. A team of investigators at a field camp consisted usually of one biologist and one field assistant, but frequently other personnel were present to carry on specialized studies.

The masses of data obtained during the study have been evaluated and a technical report is being prepared. Tentative conclusions can be given about the principal causes of caribou mortality. However, before presenting some of those conclusions, it would be desirable to examine an important phase of the concurrent efforts undertaken to improve caribou numbers.

An extensive wolf control programme has been carried out in the Northwest Territories and in the Provinces of Manitoba and Saskatchewan. The decision to embark on such a programme was predicated on the belief that any practical means to reduce the annual loss of caribou should be put into effect. The net effect of wolf predation on caribou populations was not known, but there was abundant evidence to indicate that wolves killed caribou regularly. As caribou numbers were declining at an alarming rate, it behoved responsible agencies to take all positive steps to prevent unnecessary loss. The programme was not to be one of extermination. It was designed to reduce the

THE PRESENT STATUS OF THE BARREN-GROUND CARIBOU

total population of wolves and keep it at a low level until, by management, caribou once more were relatively abundant.

Wolves in northern Canada appear to be of two "types", timber wolves and tundra wolves, although their taxonomic status has not yet been determined satisfactorily. On the barren-ground caribou range, timber wolves are largely restricted to the forest and they prey on the caribou only during the winter months, at the times when the caribou reach the areas where they live. The tundra wolves are not year-round residents of any restricted area. For two months in the spring they remain near their dens on the tundra and subsist on what they can capture or scavenge in the neighbourhood. When the pups are old enough to travel they seek out the caribou herds and for the rest of the year remain in close association with them, living mainly on caribou. A programme to curtail wolf predation on caribou had to be developed around the different habits of the two types of wolves.

A concerted effort to reduce wolf numbers in the range of the barren-ground caribou in the Mackenzie District of the Northwest Territories was initiated by the Northern Administration and Lands Branch of the Department of Northern Affairs and National Resources during the winter of 1953-4. At the same time

experimental wolf control was started by the Canadian Wildlife Service of the same Department to determine the most effective methods of wolf control and to assess the effect such control would have on populations of wolves being depleted. Additional technical data on the biology of wolves, such as movements, population structure, reproduction and diseases, also were obtained. Since that time the control programme has been expanded to include parts of the District of Keewatin. In the summer of 1957, wolf-den hunting was introduced, with Indians and Eskimos from four settlements in the Territories participating.

Since the winter of 1955-6, the Manitoba Game Branch has co-operated in the predator control programme in the southern Keewatin District by including it, at federal government expense, as an integral part of its operations in northern Manitoba. The Province of Saskatchewan also has carried out wolf control programmes in the northern portion of that province.

The basic method of baiting wolves has been the use of buffalo or caribou meat poisoned with strychnine. Because of the potential danger to humans and their dogs, particular attention was given to publicizing locations where poisoned baits were set out, with warnings to keep dogs away.

Wolf predation is thought to be a principal factor in caribou mortality. Here a large bait impregnated with strychnine is being set out on a frozen lake. A hole is drilled through the ice and the water is used to freeze the bait to the ice preventing it from being dragged away.

Manitoba Game Branch





Layout of standard set known to trappers. The bait is in line with, and equidistant from, the spruce trees. The trees serve to attract the wolves bringing them close to the bait. As many as nineteen animals have been taken at one of these baits. The sign is a warning to trappers to keep their dogs away.

Manitoba Game Branch

To be effective, poisoned baits must be placed where wolves occur in some numbers. Wherever caribou concentrate there are usually many wolves, so the baits were placed at selected locations either on caribou wintering areas or on their migration routes. The baits were placed by two methods. Aircraft were used extensively to set out numerous baits scattered over large areas. The method was both efficient and rapid. For setting out many baits in limited areas seven experienced northern trappers were hired as predator control officers. Last winter an Eskimo, Joseph Otoayok of Pellatt Lake, also was hired. Those officers were placed in key areas and put out baits with the aid of dog teams. In nearly all cases bait stations were located on frozen lakes so that, if the baits could not be retrieved before the ice melted in spring, the poisoned meat would float away and disintegrate, and there would be no further risk of poisoning other animals. Setting the baits out on the open lakes was also done to take advantage of the travel habits of wolves, which often travel in the open. Other animals, such as foxes and marten, tend to keep to the protection of the forest.

Bait stations were visited periodically to

observe their effectiveness, and in the spring were destroyed, if possible, after all the information available from them had been obtained.

A total of 5,166 wolves is known to have been killed in the Northwest Territories as a result of the control programme during the winters from 1953-4 to 1958-9 inclusive. Most of those wolves were destroyed in southern and eastern Mackenzie District. At least 1,418 other wolves were taken by officers of the Province of Manitoba in their campaign in the northern part of that province in the years 1955-6 to 1958-9 inclusive. Additional wolves were killed in the Saskatchewan Government programme.

By the summer of 1957 the Wildlife Service was confident that the timber wolf population was no longer a threat to wintering herds of caribou. Fewer tundra wolves are now being taken because their population has been reduced, but the point has not yet been reached where their threat to caribou can be discounted.

There is no danger that wolves will be exterminated as a result of the control programmes. That would be undesirable from at least two points of view. The wolf is regarded as an integral part of the wilderness environment which should be allowed to perpetuate its kind

A trapper displays pelts of two timber wolves.
Manitoba Game Branch

as long as its actions do not threaten the existence of other wildlife species or seriously conflict with the legitimate interests of man. Cost is also a consideration. Beyond a certain point, the cost of killing wolves exceeds the possible benefit. At that point any game administration must have serious reservations about carrying the control programme any further.

Wolf control in the Northwest Territories will be continued in the light of the latest biological information available about its effect on both the wolf population and the caribou population it is designed to protect. When caribou numbers are again large enough to withstand all forms of mortality, including human utilization and predation, the necessity for intensive control will diminish.

The intensive eighteen-month caribou survey results tentatively suggest that wolf predation may have an important effect on caribou numbers. One Wildlife Service biologist has estimated that the 613 wolves taken from an area where part of the study herd was wintering, could have killed as many caribou as were added annually to that herd segment through births. Until much more information is available, however, such estimations are of limited value.

A number of other mortality factors proved to be of considerable importance, and some proved to be negligible. In the latter category must come disease and parasites. No evidence came to light during the recent study to indicate that either caused the deaths of more than a small number of caribou.

Accidents probably play a minor but continuous role in caribou mortality. Drowning, a



form of accidental death, seems to be the greatest mortality factor among the adults, apart from human utilization and predation. There appears to be some drowning every year and under unusual circumstances large numbers of caribou can perish in that manner. In 1951, for example, about four hundred drowned caribou were found along the shores of the Narrows of Aberdeen Lake, N.W.T. They had probably been swamped when a sudden storm caught them swimming the Narrows.

Windchill was suggested as a possible factor in calf mortality by biologist A. G. Loughrey; this suggestion was tested in the field by two physiologists from the National Research Council. Essentially the test was made to determine the effects of windchill on newborn calves. Windchill is measured in units based on the amount of heat the atmosphere is capable of absorbing in an hour from an exposed surface one metre square at a temperature of 91.4° F. In other words, windchill expresses the rate at which the unclothed body of a human loses heat if placed out of doors under given weather conditions.

The possible effect of windchill on calf sur-

Some of the timber wolf heads turned in to a conservation officer in northern Manitoba.

Manitoba Game Branch





A herd of caribou crosses a river near Beverly Lake, N.W.T.

Sask. Photo Service

vival was realized when weather conditions at calving time were observed. In early June, when calving commences, high winds, low temperatures, and continuous or frequent precipitation in the form of snow, sleet or rain, can prevail. There is no shelter on the calving grounds and the newborn calf may have to spend the first few hours or days of its life contending with the chilling effects of weather. Evidence has been obtained since 1951 to indicate that mortality of newborn calves, sometimes heavy, has resulted from adverse weather. From the recent windchill studies has come a quantitative relationship between weather conditions and the metabolic response of newborn caribou calves to overcome the resulting body heat loss. The nature of the studies gives some hope that it may be possible in the future to predict the approximate size of the calf crop on a given calving ground, when weather conditions are known.

The intensive research study has clarified

many details of caribou biology and mortality. It also confirmed earlier conclusions that human utilization is still the most important single mortality factor. In 1948 the human kill of caribou was believed on good grounds to be about 100,000. In 1954 the estimated kill was about 65,000 and in 1955 it was about 73,000. In each of the latter two years the kill could have constituted about 20 per cent of the entire mainland barren-ground caribou population. During the winter of 1957-8 it was estimated that not more than 15,000 animals were taken. The sharp drop does not reflect improved conservation to any large degree, but merely shows the diminished availability of caribou.

The importance of the human kill becomes apparent when the annual calf crops are considered. During the years 1950 to 1957 the percentage of calves in the herds in late winter exceeded 13 per cent only in 1952. In three of those years, it was less than 8 per cent. The kill of caribou by humans alone was therefore greater than the number of caribou born and surviving the first year of life. When losses by other means, such as accidents and predation, are added to the human kill, it is no wonder that caribou are being extirpated in large areas of the North.

Before the Indian and Eskimo hunters learned to use rifles, the caribou kill was probably less than the calf crop even in years with poor calf survival. The greater mobility of hunters brought about by the increase in dog teams and



... A cow and its calf make the trek across.

Sask. Photo Service

THE PRESENT STATUS OF THE BARREN-GROUND CARIBOU

the introduction of highly efficient fire-arms increased the total kill beyond the capacity of the herds to withstand it.

The evidence gathered since 1948 leads to one inescapable conclusion. The human kill of caribou alone is sufficient to exterminate the caribou. Unless immediate and effective control is instituted, this once prolific and valuable Arctic resource will be gone.

Recognizing the situation, the federal government has initiated a number of steps to reduce the kill. In the Northwest Territories only the holders of general hunting licences (Eskimos, Indians and a few white old-timers) are allowed to hunt caribou. In the northern portions of the Provinces of Saskatchewan and Manitoba no hunting of barren-ground caribou by white people is permitted. In Alberta, hunting by white residents is confined to heads of northern families who are allowed five caribou a year. The need for caribou conservation has been publicized in the North, among children and adults. Measures have been taken to encourage the utilization of other forms of wildlife, particularly of fish, as food for humans and for dogs. Regulations against wastage of caribou, providing penalties for failure to retrieve carcasses or for feeding caribou meat to dogs, have been enacted and are being enforced. In spite of those measures, however, the caribou situation remains precarious. Calf crops in 1958 and 1959 have been unusually good, but even with good calf crops the herds will barely hold their own, or else will increase so slowly that the full economic potential of the resource

cannot be restored in the foreseeable future if the present human kill continues.

For many Eskimos, particularly those who formerly depended heavily on caribou, and for some Indians as well, the caribou may never regain the same economic importance. Efforts by the government to provide new sources of income, schools for children, and employment on defence projects in the North, have brought some of our northern peoples beyond the point where they can revert easily to the old way of life. For those, however, who wish to live in the manner of their forefathers, it is the hope of the governments concerned that caribou may, at some future time, assume a different, additional, and perhaps equally important, role. If caribou once again become abundant, they will provide not only food and other essentials, but may also serve as a source of income to Eskimos and Indians who can act as guides and outfitters to sportsmen. The attraction to southern sportsmen of hunting a trophy animal in an Arctic environment may eventually mean more to some Eskimos in dollars and cents than caribou meat and clothing. The present caribou situation, however, provides little hope for sport hunting in the foreseeable future.

The barren-ground caribou is adapted to living successfully in Arctic and sub-Arctic regions. What a waste of a rich resource it would be, should the species be reduced to a few animals living a precarious existence on the way down to extinction! The caribou, and our northern peoples, deserve a better future than that.

A hunter stalks. The rifle has been largely responsible for the decline in caribou numbers.

Canadian Wildlife Service





Malta is a British colony consisting of three populated islands and two uninhabited islets about sixty miles south of Sicily in the Mediterranean Sea. The main islands are Malta, Gozo and Comino. On the first of these stands the capital, Valletta. Shown here are the steps and overhanging windows of St. Ursula Street, Valletta.

Malta G.C.

Photographs courtesy of Central Office of Information, London, England

MALTA FIRST emerges out of the mists of early history as a Phoenician colony at a high level of commercial prosperity. The Carthaginians landed here in the sixth century before Christ, and there is a legend that Hannibal was born on this island. In the course of the Punic wars, Malta fell under Roman domination; the great orator Cicero ruled as quaestor in the year 75 B.C. and in the year A.D. 58 St. Paul was shipwrecked here on his way to Rome. On the break-up of the Roman

Empire, Malta became a part of the Byzantine Empire. It suffered invasion from the Arabs from whom it was eventually delivered by the arrival of Count Roger the Norman in 1090, and later it was united to the Kingdom of Sicily.

In 1497 the Turks invaded Malta with its neighbouring island of Gozo, but gained no permanent foothold. The island was next dominated by the Kingdom of Aragon, and under the rule of the famous Emperor Charles

V, the island was handed over to the Knights of St. John in 1530. The Knights of this celebrated order proceeded to fortify the island against the Turks and won immense wealth in the course of their privateering expeditions. These attacks culminated in the great siege of Malta in 1565, by which the Knights of St. John won great renown for checking the Mohammedan advance on southern Europe. Their leader, La Valette, gave his name to the Valletta, an example of fortification generally acclaimed to be "unrivalled in the world", and their dominant power was unquestioned till the eighteenth century when bad government and Turkish rebellions led to their gradual downfall. Napoleon Bonaparte captured the island in 1798. He made French the official language and declared that ecclesiastical jurisdiction must cease. On Napoleon's departure for Egypt, Lord Nelson, with the aid of Portuguese allies, established the blockade of Malta, and by the Treaty of Amiens in 1802, Malta was restored to the Knights of St. John. But the Maltese objected and at the Treaty of Paris, 1814, Malta was placed under British protection amidst the acclamations of the Maltese, and a substantial revenue was granted annually to the island from the British exchequer. Throughout the nineteenth century various governmental improvements were made, and in 1936 Malta became a crown colony.

MALTA G.C.



The prominent part played by Malta during the Second World War was recognized in 1942 by the award of the George Cross. The Island was invested with responsible government in 1958 following the declaration of a state of emergency arising from the resignation of the then Maltese Government and the outbreak of riots. A constitutional conference to restore self-government broke down in December 1958, and the present interim constitution, under which the executive authority of government is vested in the Governor assisted by an Executive Council, came into force on 13th April, 1959.



The bastions of the Old City look down on the bus station, just outside the walls of Valletta. Valletta stands on a rocky promontory with harbours on both sides. It contains a number of interesting buildings, including some dating from the sixteenth century associated with the rule of the famous Knights of St. John.



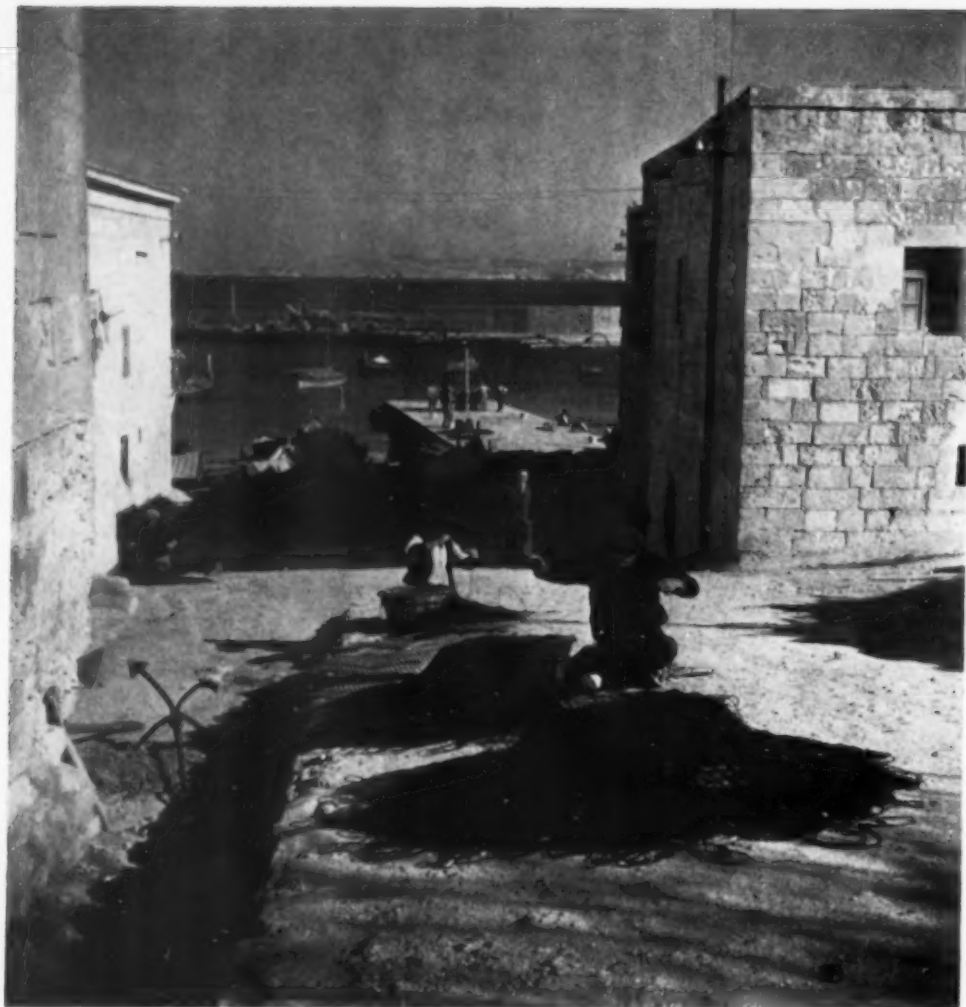
Top left:—The Maltese are accustomed to using almost every square inch of tillable land. At Xlendi, on the island of Gozo, the field is carried to the very edge of a gorge.

Right:—Malta's traditional lace industry employs mostly women, who do the work by hand. A cheerful quartet of workers at Nadur on the island of Gozo.

Bottom left:—Malta's dense population is concentrated in urban areas. Less than one-third of the people live on the land and agricultural methods are still somewhat primitive. The main products are potatoes, tomatoes and citrus fruits. Generally goats are kept rather than cattle because they can survive on sparser grazing. A travelling "shop", drawn by a horse, tempts villagers with wares from the cities.

Below:—A mule-driven scoop-wheel picks up brackish water from a twenty-five-foot well to irrigate this potato field at Ta Limbordin, near St. Paul's Bay. The farmer is splashing the water down gullies between the rows of potatoes.





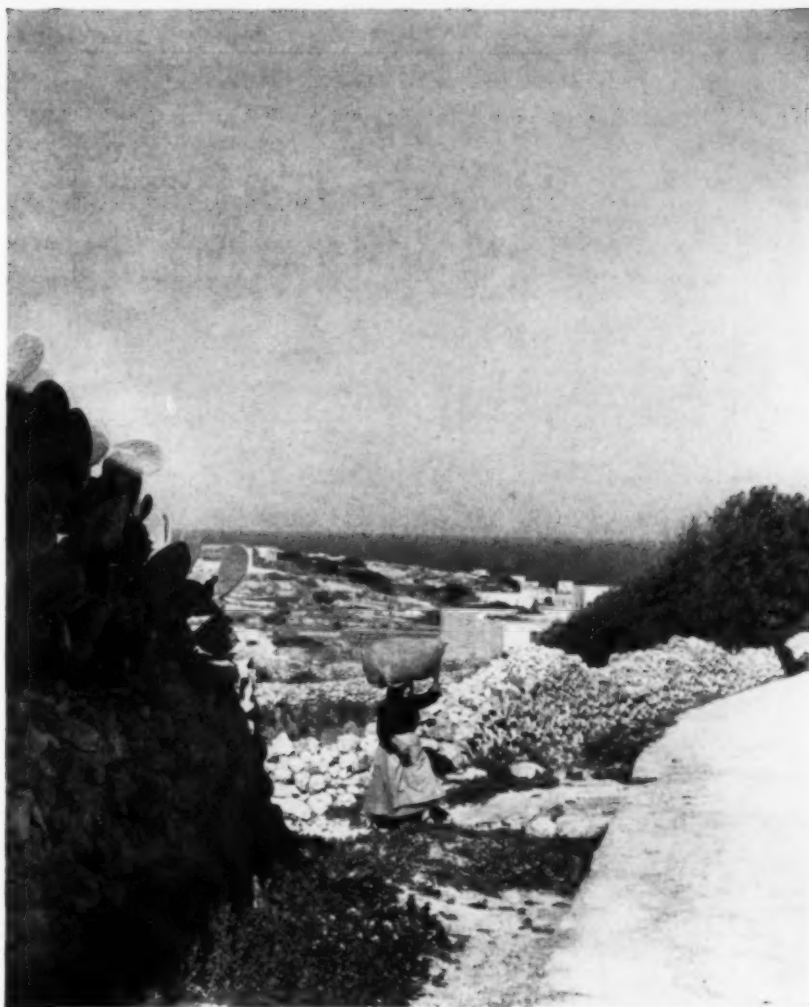
Most Maltese fishermen still use old methods. Nets are often mediaeval in pattern. Some are of reed, some of rope.

Malta has no large fishing fleets and no steam trawlers. Some of the boats have motors, but very few. Using their ingenuity, a group of fishermen fit a new engine in one of the large boats at St. Paul's Bay.



In the exposed places of the islands of Malta the natural verdure is a form of cactus (left). The woman climbing the path is carrying on her head a sack of cabbages cut for sending to city markets.

Unloading the milk boat from Gozo island at Marfa, Malta's ferry port.



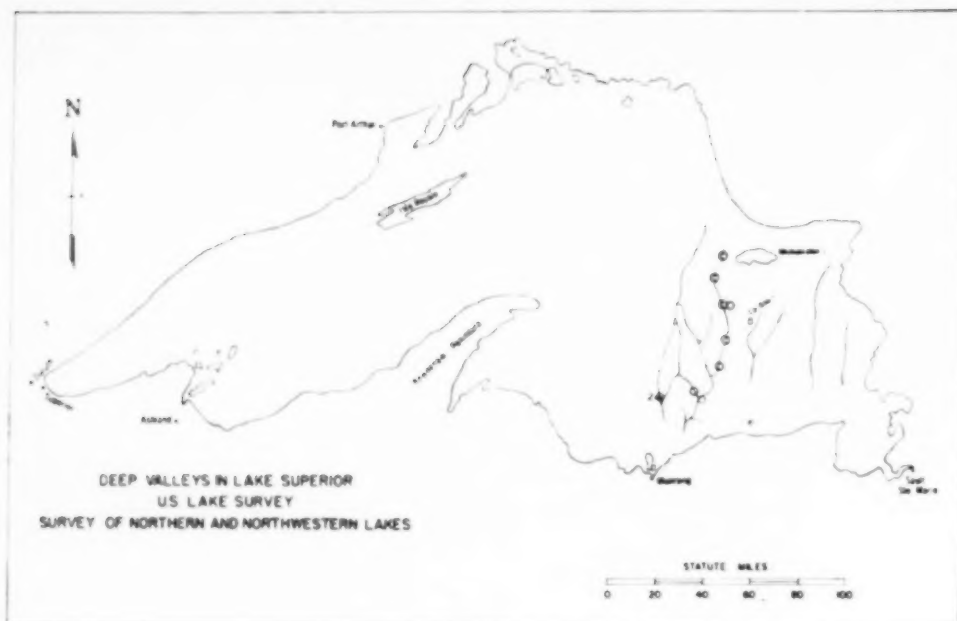


Figure 1

LAKE SUPERIOR is the largest of the Great Lakes and also one of the largest expanses of fresh water in existence. It is characterized by deep water and by high and rocky shores along the major portion of its coast.

Prior to 1956, the deep-water areas of the lake had not been sounded in sufficient detail to give more than a superficial idea of the configuration of the lake bottom. In 1956, the United States Lake Survey began a three-year programme to resound the deep-water areas of the entire lake on lines spaced a maximum of a mile and a half apart. As a result of this survey interesting and unique submarine features were discovered.

Whereas in the westerly portion of the lake the bottom is relatively flat, in the easterly portion the depth varies widely over short distances, and the bottom is marked by a network of ridges and valleys. These valleys are more than 700 feet deep in places and range from a half mile to several miles in width. The greatest depth recorded was 1,333 feet, placing the lake bottom at that point about 731 feet below sea level. Depths on the adjacent ridges are only 565 feet on one side of the valley and 793 feet on the other.

Figure 1 shows the outlines of the principal valleys. The points at which bottom samples were taken are marked by circles.

*This article is based on material supplied by the courtesy of District Engineer, U.S. Army Engineer District, Lake Survey.

Valleys in the Bottom of Lake Superior*

Figure 2 is a reproduction of the sounding record where the sounding line crossed the deepest valley. The position of this cross-section is indicated on Figure 1 by the identifying numeral 2.

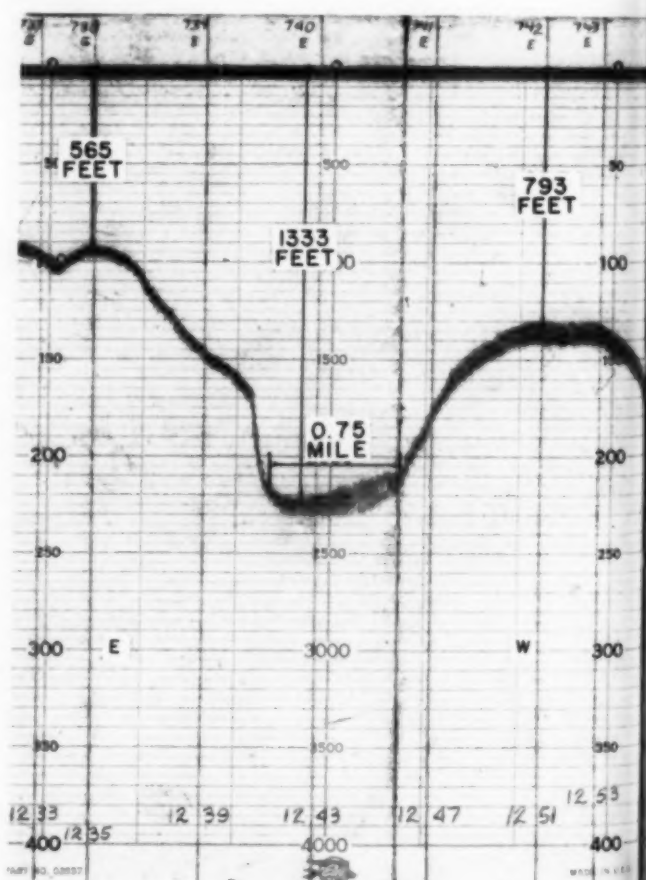


Figure 2

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EDITOR'S NOTE-BOOK

H. T. Renouf (*The Port of St. John's*) served for twenty-five years as Executive Manager of the Newfoundland Board of Trade prior to assuming his present post, in August 1959, as Registrar of the Memorial University of Newfoundland.

* * *

Les Edwards (*The Story of Helicopters in Canada*), is a regular contributor to aviation journals. A former public relations officer with Spartan Air Services Limited, Ottawa, he is now working for television station CFQC-TV, in Saskatoon.

* * *

J. S. Tener (*The Present Status of the Barren-ground Caribou*) is Supervising Wildlife Biologist, Eastern Arctic, Canadian Wildlife Service, Ottawa. His article is based on the research findings of A. W. F. Banfield, J. P. Kelsall, A. G. Loughrey, and others in the Canadian Wildlife Service.

AMONGST THE NEW BOOKS

Niagara: Hinge of the Golden Arc
by Marjorie Freeman Campbell

(Ryerson Press, Toronto, 356 pp. \$6.00)

Since the "Golden Arc" is a more poetic term for the popularly known "Golden Horseshoe", one might expect this book to be an economic geography of the Niagara portion of the industrial and urban complex around the western end of Lake Ontario. Instead, it is primarily a history of the Niagara Peninsula with bits of geography thrown in here and there to round out the picture.

Unfortunately, the author's treatment of the economic geography of the area does not measure up to her description of the landscape. There is insufficient evidence offered to show that the Niagara region is the "Hinge of the Arc". Nor is much light shed upon the intricate relationships between the industrial and agricultural activities and the geographical factors. The comments about the urban encroachment of Niagara fruitland do indicate, however, some depth of understanding of that problem.

Although the book suffers from poor organization, it does make a real contribution by presenting a wealth of historical detail not found in the textbook type of history. Interesting

(Continued on next page)

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facts, anecdotes and legends are given about every facet of Niagara history: the conflicts of the Indians, the sacrifices of the missionaries, the adventures of the explorers, the hardships and contributions of the settlers, the cruelties of the war against the Americans, the development of transportation facilities, and finally the growth of towns and cities. The author makes history live again by lavish use of excerpts from papers, diaries, and letters.

The chapter entitled "Ships Climb a Mountain" is an interesting account of the history of the attempts to circumnavigate Niagara Falls, from the eight-foot canal resulting from the bold efforts of Thomas Merritt in 1829, to the modern Welland Ship Canal, now a part of the St. Lawrence Seaway.

Those who know the Niagara district well, will derive much enjoyment from the minute descriptions of the many historical landmarks in the area, such as Brock's monument at Queenston, William Lyon Mackenzie's home where his battered hand-press still stands, and the church of St. Saviour, dedicated to Brock, saviour of Upper Canada.

Sketch maps would have been a valuable addition for persons wishing to visit the landmarks described.

In summary, *Niagara: Hinge of the Golden Arc* is not a good geography, is not an historian's history, but nevertheless contains so much vivid description and so many historical gems, that this reviewer recommends it to anyone who has an interest in this Canadian peninsula which is rich in natural environment, economic activity, and historical heritage.

RALPH R. KRUEGER

Mr. Krueger is assistant professor of geography at Waterloo College, Waterloo, Ontario.

* * *

Book of American Indian Games

by Allan A. Macfarlan

(Association Press, New York. \$3.95)

It is perhaps unfair that I, as an archaeologist who has an ethnological interest in games of the American Indian, review this charming book entitled *Book of American Indian Games* by Allan A. Macfarlan. Ethnologically speaking, the book has many defects. Not all American Indian games are mentioned, the

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cultural areas and tribes are very sketchily given, total tribal distribution of those who played the games described is overly brief, and comments on the social aspects of the games are very superficial. For the anthropologist the book is in no way comparable to the magnificent exhaustive work of Stewart Culin entitled *Games of the North American Indians*, Bureau of American Ethnology, Twenty-fourth Annual Report 1902-03. Washington, 1907.

But as I stated, such a criticism is unjust for Mr. Macfarlan is not attempting to write an ethnographic treatise. The author clearly indicates in his introduction that this book "has been written because of the great demand for a comprehensive book of Indian games suitable for recreational groups of all sorts . . . who find themselves at a loss for interesting and amusing games which can be played on the spur of the moment and require little or no equipment."

The book fulfils this purpose admirably. It is well and simply written. The kinds of games are classified in a logical manner. Between the written instructions and line drawings concerning the games no one should have trouble playing the games mentioned in the book. In a few cases I felt that more drawings concerning the games would be a welcome addition but perhaps this lack is the fault of the publisher, not Mr. Macfarlan. All in all, I feel that this book fills a gap in our literature on children's games and would most heartily recommend it to anyone who has to deal with groups of children from four to sixteen years old. No Boy Scout or Girl Guide troop or similar group should be without a copy.

RICHARD S. MACNEISH

Dr. MacNeish is senior archaeologist at the National Museum of Canada.

Reflected Lights

by Frank Panabaker

(Ryerson Press, Toronto. \$5.00)

This pleasant collection of seventeen word-paintings or sketches, in as many chapters, faithfully reflects the character of the artist who drew them from a life rich in human understanding and warm, friendly emotion. Its 159 pages of text offer the reader seventeen depictions of people and places in landscape country across Canada, with an excursion to the West Indies for good measure.

While this, Mr. Panabaker's first book, is essentially composed of personal recollections presented in an unassuming, amusing way, its nar-

(Continued on page XI)



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rative episodes are concerned mainly with the textures and patterns of other lives than his own. Under these circumstances we should not expect, nor do we find, an index at the close of this little volume. However, a brief, illuminating foreword by the author and Dr. Lorne Pierce's excellent biographical outline in the introduction afford ample compensation; the one explaining the author's own purpose and approach in writing, the other clearly indicating what most enquirers would wish to know about his background and professional accomplishment. In addition, the sixteen pages of prefatory material offer a paged table of contents for the chapter titles, and a list of illustrations by name and facing page reference. Of two dozen paintings reproduced (with mention of their dimensions and owners' names), half come in colour, the rest in black and white — all of them well selected and attractively printed.

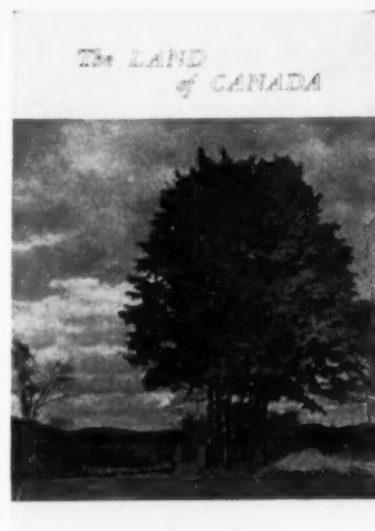
Mr. Panabaker's book presents to his friends, those who appreciate his art or love the spirit of Canada, a refreshing source of emotion and insight to which one can turn at will, without being disappointed. Some of

(Continued on next page)

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his boyhood tales, such as "The Kite" and "The Favour", take their place among the more memorable examples of Canadian story-telling. Not unreasonably, "The Exhibition" turns out to be the author-artist's most delightful and satisfying chapter.

A. E. H. PETRIE

Mr. Petrie is assistant head of the Prints and Drawings Division of the Public Archives of Canada.

Small Boat Through Holland

by Roger Pilkington

(The Macmillan Company, Toronto, 217 pp. \$4.25)

Canal cruising is one of the more civilized sports; as Roger Pilkington writes in this book, "aboard a boat, history and beauty flow silently past in a never ending stream". If this sounds discouraging to those harder armchair sailors who favour the rolling round the Horn yard-arm under school of writing, let them not despair. *Small Boat Through Holland* is an enjoyable book with something for most readers, even to adventure in the placid waters of the Netherlands canals, not all of it gentle or philosophic.

Afloat in Holland one is part of the national life in a way that is more intimate than with other forms of travel. The author recounts many a yarn from passing bargemen and longshoremen; of the tragic days of the Nazi occupation, of older equally remembered troubles with the Spaniards in the time of Alva, of local legend and the everyday happenings of river traffic among the Old Masters of the maritime world.

Dr. Pilkington writes of his boat for the sheer fun of it; his work runs on unhurriedly in a literary tradition headed by Robert Louis Stevenson's *Inland Voyage* and C. S. Forester's *Sailing Across Europe*. His boat is a converted admiral's barge which, drawn from every conceivable angle by David Knight, figures in many of the delightful illustrations. The artist is evidently something of a sailor for he has an eye for a boat, and one might add, a crisp style with his pen whether for the tracery of rigging or the warm brick of a Dutch gable.

If you are ambitious to explore Holland by water you will find this an interesting book; if, like me, you are simply one of those people who cannot resist boats and barges in the reach of a river, you will enjoy it just the same.

THOMAS E. APPLETON

Lieutenant-Commander Appleton, R.C.N.(R) is on the staff of the Naval Constructor-in-Chief in the Department of National Defence at Ottawa.

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SEE YOUR LOCAL AGENT—NO ONE CAN SERVE YOU BETTER

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CUNARD



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THE QUEBEC WINTER CARNIVAL's gay parades, ice canoe races, and street dancing with Le Violonneux setting the tune, are only some of the famous highlights of this distinctively French Canadian pageant.

Seagram

tells the World
about Canada

The advertisement on the facing page is one of a series now being published by The House of Seagram in magazines circulating throughout the world. From these Seagram advertisements the people of many lands—in Latin America, Asia, Europe and Africa—come to know Canada better, her wealth of resources, her typically Canadian events such as the Quebec Winter Carnival and her renowned cultural activities.

Over the years, through its advertising abroad, The House of Seagram has continually told the people of other lands about our country and her many distinctively Canadian customs, achievements and products.

The House of Seagram has always believed that, in addition to promoting its own products in foreign markets, promoting the reputation abroad of *all* Canadian products and accomplishments is in the best interests of every Canadian.

Through these full-colour world-wide advertising campaigns, Seagram helps unfold the story of the Canadian people and their use of the rich natural resources of this favoured land... an inspiring narrative of our great and growing nation.

HENRY SIMPKINS, A.R.C.A.

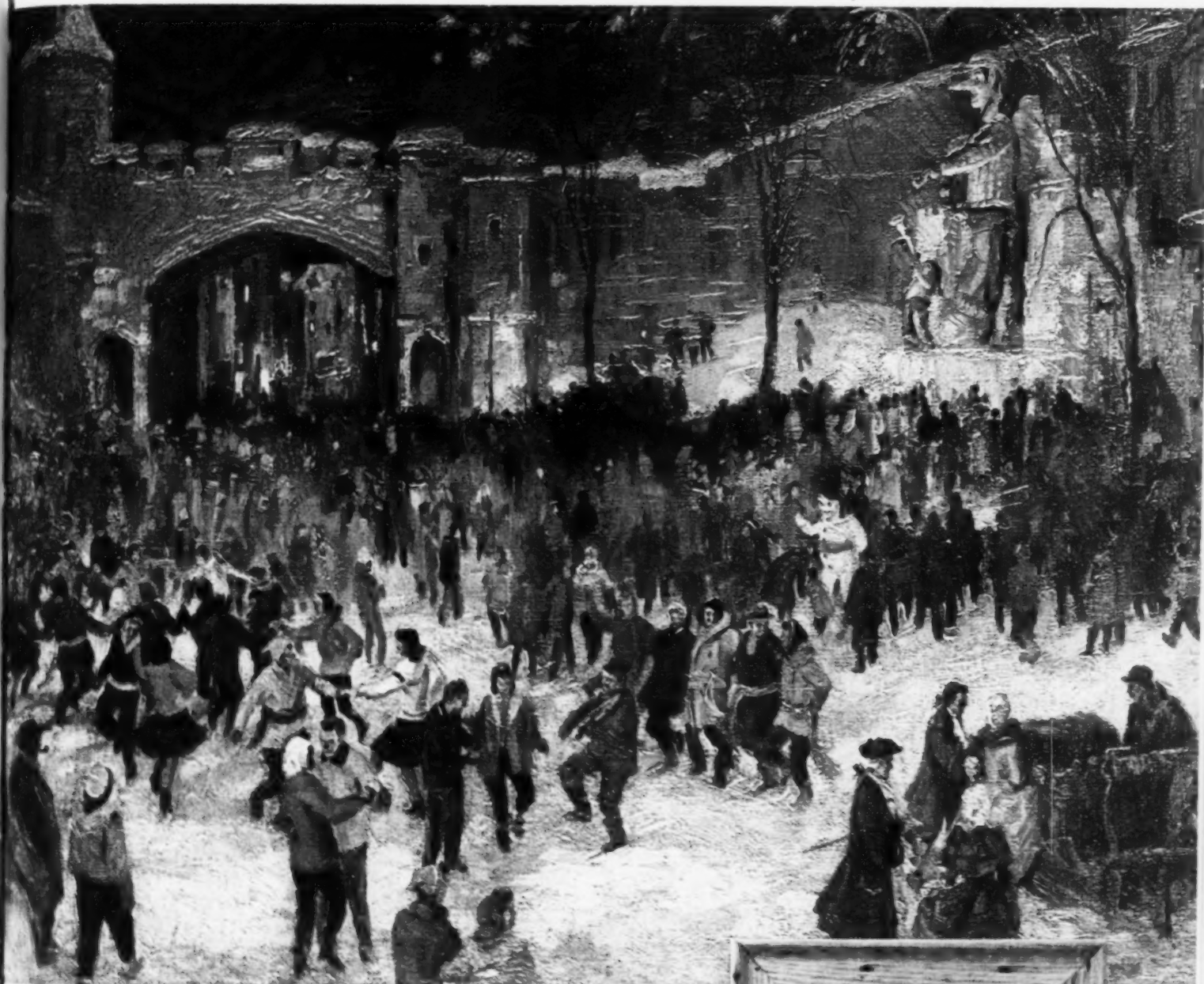
Born and trained in Winnipeg and twice winner of the Jessie Dow Prize in water-colours, this well-known artist has worked as an illustrator in Winnipeg, London, New York and Montreal. Interested in various subjects, including portraits, he has sketched many parts of Canada from coast to coast.



For reprints of this painting, suitable for framing, write: The House of Seagram, 1430 Peel St., Montreal, Quebec.

Canada is Famous for its Winter Carnivals

ONE OF CANADA'S most spectacular snow-time festivals is the Quebec Winter Carnival, whose colourful events annually attract thousands of spectators and participants from all over North America.



Painted for The Seagram Collection by Henry Simpkins, A.R.C.A.

Canada is Famous for Seagram's V.O.

Honoured the world over for its smoothness,
light-body and delicate bouquet, Seagram's V.O.
is the lightest, cleanest-tasting whisky you ever enjoyed.
That's why: *More people throughout the world buy Seagram's V.O.
than any other whisky exported from any country.*

Say Seagram's and be Sure

MORE THAN 100 YEARS OF KNOWING HOW





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I Was No Lady
by Jean W. Godsell
(Ryerson Press, Toronto. 212 pp.
\$4.95)

I Was No Lady is a racy account of the life of the wife of a Hudson's Bay Company trader at Fort Fitzgerald in the years immediately following the First World War.

Mrs. Godsell protests at every opportunity that she eschewed gossip while she was in the North. In her book she fully makes up for her years of abstinence and scarcely a person emerges with his or her character unsullied. For those who do not share Mrs. Godsell's scruples about gossip this may, perhaps, make for entertaining reading. It also illustrates in a striking way the petty antagonisms and merciless one-up-manship rampant in a small northern settlement at that time. Many of the statements are most revealing. Mrs. Godsell's "first lesson in Indian psychology" was to give her Indian servant "what-for on an average of once a month. Often I had to make an excuse for doing so." It seems scarcely surprising that a drunken Indian should say to her, "You damn palefaces t'ink you own whole worl'."

Mrs. Godsell's style makes tiresome reading as she believes in using as many adjectives, exclamation points, italics and capital letters as possible. There are a few surprising statements in the book; for instance her regret that the Alexandra Falls "are so far from the beaten path," when the Mackenzie Highway has passed near them for the past few years. The map illustrating the author's travels is very poor, being merely a rough free-hand sketch. Most of the photographs are interesting and of a good standard but some have lost value by being reproduced three or four to the page.

DIANA ROWLEY

Mrs. Rowley is editor of the *Arctic Institute's Special Publications*.

Recently Received from Publishers

Modern Geographies. By T. Herdman and A. Hurworth. (Longmans, Green and Company, Toronto). Particularly useful for high school students, this book offers a complete edition of three volumes previously published under the titles "The Southern Continents", "The Northern Continents", "Europe and the British Isles".

Quetico Geology. By V. B. Meen. (University of Toronto Press, Toronto). In collaboration with the Ontario Department of Lands and Forests the Quetico Foundation has sponsored a series of monographs dealing with various aspects of the Quetico Provincial Park. This is the second volume of the series.